Study Finds Superworms Can Biodegrade Persistent PVC Microplastics

Researchers uncover how insect gut microbes help break down one of the world's most durable plastics

BEIJING, CHINA, May 28, 2026 /EINPresswire.com/ -- A new study has found that larvae of the superworm, Zophobas atratus, can biodegrade polyvinyl chloride (PVC) microplastics, a major finding for research into sustainable plastic waste treatment.

> "The superworm gut functions as a living microenvironment where host responses and microbial activities work together to promote transformation of the polymer."
>
> *Research Team*

PVC is widely used in pipes, cables, films, and construction materials, but its strong chemical structure makes it highly resistant to natural degradation. Researchers investigated whether superworms could do more than physically fragment PVC and found that the larvae were able to ingest and biologically transform the plastic over 28 days, achieving a PVC removal efficiency of more than 40%.

Chemical analyses confirmed that the PVC polymer chains underwent chain scission, oxidation, and dechlorination inside the insect gut. The study also showed that gut microbes played a key role in the process. When the microbiome was suppressed using antibiotics, PVC degradation rates dropped significantly.

Researchers found that part of the PVC was converted into chlorinated organic intermediates, while a smaller portion was mineralized into carbon dioxide, water, and chloride ions.

About the Research Team:
This study was conducted by researchers from the State Key Laboratory of Water Pollution Control and Green Resource Recycling at Tongji University, the Department of Civil and Environmental Engineering at Stanford University, and collaborating teams from the Department of Entomology at Michigan State University. The research team has long focused on plastic pollution, biodegradation, insect gut microbiomes, environmental pollution control, and resource recovery. Their work aims to reveal how plastics are transformed in biological systems and to explore new pollution control strategies that combine environmental safety with resource recovery potential.

Conclusion:
The findings provide new insight into insect-assisted plastic biodegradation and may help support the future development of biohybrid or microbiome-inspired technologies for plastic pollution control and resource recovery.

Read the full article here:
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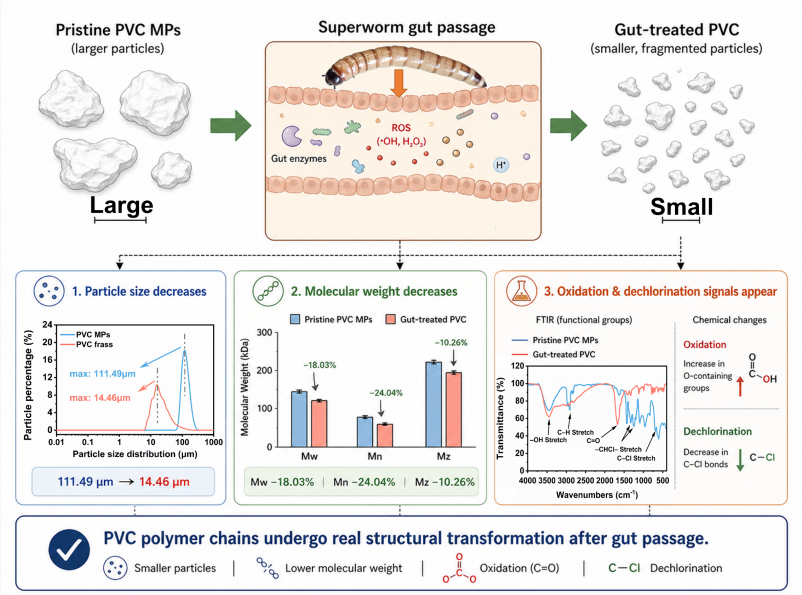

Fig 1: Illustration showing how Zophobas atratus (superworm) larvae ingest and biodegrade high-purity PVC microplastics inside their gut. The graphic highlights the gut as a host–microbe-driven microenvironment with elevated reactive oxygen species (ROS),